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Using the automated system robust modeling for study the surfaces and gravity fields planets

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Abstract

© SGEM2018. Modern versions of the ASRM-2017 (Automated System for Robust Modeling) package provide a solution to a large range of problems associated with modeling surfaces and gravity fields of planets. However, their application requires creation of not only the global models but working models of the local surface areas as well. Currently, these regional geopotential models are in high demand in geology and oil exploration. To solve the problems of this kind, the special algorithms were created and implemented because the methods of developing global models are not always suitable for the development of the model in accordance with the limited surface area. The capability to create and analyze models of local parts of the surface is the main feature of the ASRM-2017. The required calculation accuracy of the model and output data are provided. Mathematical models developed on the basis of the ASRM-2017 may be applied in a wide range of density measurements from regular measuring networks with short distances between the points to irregular networks with the points located far from each other. With increasing distances between points, and irregularity of increasing the accuracy of prediction of constructed mathematical models increases, reaching and exceeding the accuracy of interpolation for some interpolation formulas. The capabilities of modern working version of the software package allow to carry out precise modeling of the planetary parameters distribution (topography, gravitational and magnetic fields, etc.) as on the whole planetary surface and on its local parts. The software can also be used in geology and oil exploration.

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Keywords

Adaptive modeling, Global and local models of surface areas and gravitational fields of planets, Mathematical models, Robust methods, Software packages

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